Cooling System Bleeding

Cooling systems can be an engine installer’s greatest enemy, especially if they do not follow proper bleeding procedures. Starting in the latter part of the ‘80s through today, the design of vehicles took a turn to more aerodynamic designs that would improve fuel economy. The vehicles front fascia became lower and rounder with aerodynamic plastic covers, cab forward designs. Radiators are now typically much lower than the top of the engine. The problem with all of this is that filling a cooling system after installing an engine is no longer a simple task. The potential for air pocket hot spots is now a much more common threat and bleeding the cooling system is mandatory.

“Bleeding” the cooling system refers to removing all air from the system. Air in the cooling system does not transfer heat efficiently, causes hot spots and the subsequent overheating and can lead to serious engine damage. Bleeding the cooling system is a critical part of any engine installation or engine repair that includes a radiator hose, water pump, or radiator. DAMAGE TO YOUR ENGINE RESULTING FROM OVERHEATING IS NOT COVERED UNDER THE LIMITED WARRANTY.

Filling the engine with coolant through a thermostat housing, a hose at the high point of the engine prior to filling the radiator is a good start. Many of today’s radiators require filling through the reservoir tank and do not allow for adequate bleeding. There is also equipment available that will actually draw coolant through the system via vacuum.

Once the engine is running, turn the heat to max to allow the coolant to circulate throughout the whole system and eliminate any air pockets. Raise the engine speed to approximately 2,000 rpm and hold for about 15 seconds. Do this several times so that the coolant circulates quickly and pushes out any air pockets that may cause overheating. Many of today’s vehicles have bleeder valves specifically designed to remove air from the cooling system. Some new thermostats that have bleed holes in them allow for continuous air bleeding.

When you feel that you have bled the system completely, seal the cooling system and drive the vehicle until it reaches normal operating temperature. If the gauge shows any signs of excess heat or overheating, stop and repeat the bleeding process to ensure that you get all the air out of the system.

Why is proper cooling system operation and bleeding air pockets to avoid hot spots so important? The longevity of the engine relies on proper cooling. If hot spots remain, premature engine failures will result.
The symptoms will be piston scuffing on one side of the skirt and cylinder bore. This damage usually occurs on the inboard side of a "V" type engine along the lifter valley where the coolant is at its highest point in the engine block. This damage due to an isolated hot spot in the cooling system will occur even though the piston and cylinder bore were sized correctly by the manufacturer.